

# KANSAS FLOODPLAIN MANAGEMENT TIPS



February 2016

## Locating Safe Rooms in Floodplain

We have tornadoes in Kansas every year. Every County in Kansas has its share of tornadoes. High risk floodplains are as likely to have a tornado as a low or moderate risk floodplain. Because we have so many tornadoes a common question that comes up is about basements. Many people want to build a basement in the floodplain because of tornadoes.

Basements in the floodplain are simply not a good idea. As a basement goes deeper below the flood level there is increased pressure on basement walls. Local communities often have codes that require a fire egress from the basement which becomes another point of entry for flood water to enter. Aside from the safety and building requirements there is the insurance issue. A new building with a basement would have insurance rated to the level of the floor of the basement and could be a very expensive policy.

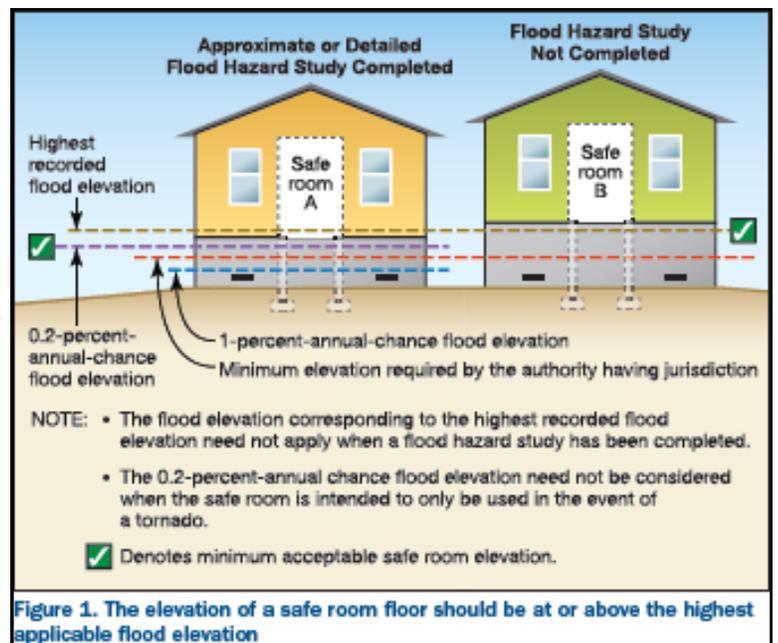
When asked about basements the alternative to suggest is a safe room that is built above the base flood level and required freeboard. There are some excellent Federal Emergency Management Agency (FEMA) documents that explain the requirements for safe rooms. The illustration at the right comes from the Quick Guide, February 2015, Flood Hazard Elevation and Siting Criteria for Residential Safe Rooms. There is also a Quick Guide, February 2015, Flood Hazard Elevation and Siting Criteria for Community Safe Rooms. Copies of both Quick Guides will be attached to the email version of this newsletter.

The FEMA book "Safe Rooms for Tornadoes and Hurricanes, Guidance for Community and Residential Safe Rooms" FEMA P-361 Third Edition was updated in March of 2015. The book "Taking Shelter from the Storm, Building a Safe Room for Your Home or Small Business" FEMA P-320, Fourth Edition was updated in December of 2014. These are two good books with recent updates. The FEMA P-320 book has construction plans inside of it.

Sooner or later, every Floodplain Manager will be asked about basements or tornadoes. Smart community officials won't just say no to people who ask about basements but will offer an alternative and have knowledge about how to properly construct a safe room. Order safe room publications from FEMA by calling 1-800-480-2520.

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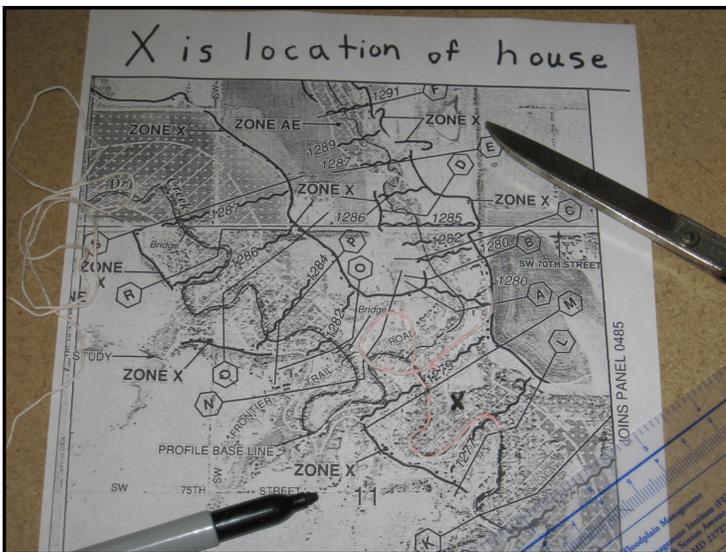
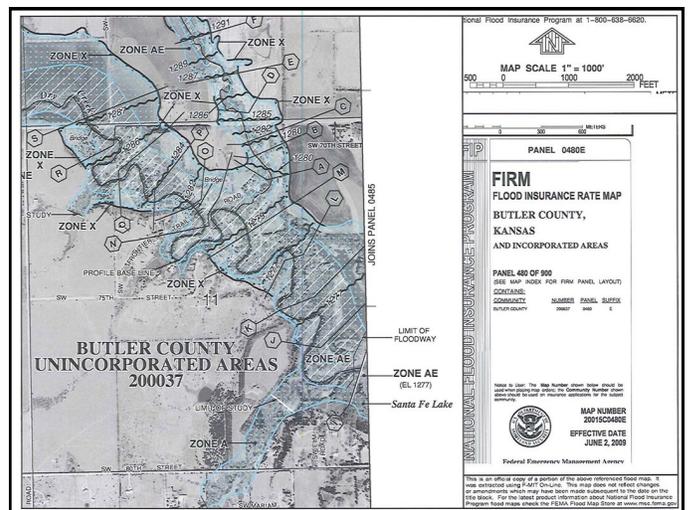
## Use the Flood Insurance Study

Many of the cities and counties in Kansas have flood maps that only show unnumbered Zone A areas on the maps. Those types of maps do not come with a Flood Insurance Study (FIS). Every community that has a map showing elevations or floodways should have an FIS. The FIS is a book that contains a great deal of information that is not displayed on the maps.

A Flood Insurance Rate Map (FIRM) or an older Flood Boundary and Floodway Map (FBFM) will show you the limits of the floodplain for a 1% annual chance event. The maps don't provide the velocity of the water in cubic feet per second at a certain point, the history of flooding for an area or predicted water surface levels for a 10% annual chance event. That information can be found in the accompanying FIS.

A common mistake is to use the numbers shown on a FIRM as a base flood elevation. The numbers shown on older FIRMs are rounded off to nearest whole foot. Buildings have been built too low in high risk flood zones because the elevation was based on a number that was rounded down. When you have an FIS always use the FIS to calculate a base flood elevation (BFE). You should never accept a rounded off number taken from the FIRM as the BFE.

Here is an example of how to calculate a BFE for a property. For this example we will use a location upstream of cross section L and down stream of cross section M on Dry Creek. To illustrate the method maps and pages from the FIS are printed and drawn on. Highlight colors are used to make things easier to see and aren't necessary in your office.



In the photo to the left an X marks the upstream corner of the structure closest to the flood source. Use the upstream corner because water generally flows downhill and that will be the highest point. Use a ruler to measure the length of the main stream channel. A simple method to do that is to lay a piece of string along the channel and mark the string. Then you can pull the string straight and measure the length of the channel as well as location of the structure along the channel.

Water Structures Program Engineers working for Division of Water Resources (DWR) will sometimes use a different method. The permitting engineers say that during a flood the water will not follow the stream channel. The flood water will be out of the banks and flow across the floodplain more directly. They measure directly across from one cross section to the next. This difference in methodology is the reason why a floodplain manager in a community may calculate a BFE that is slightly different than shown on a DWR permit.

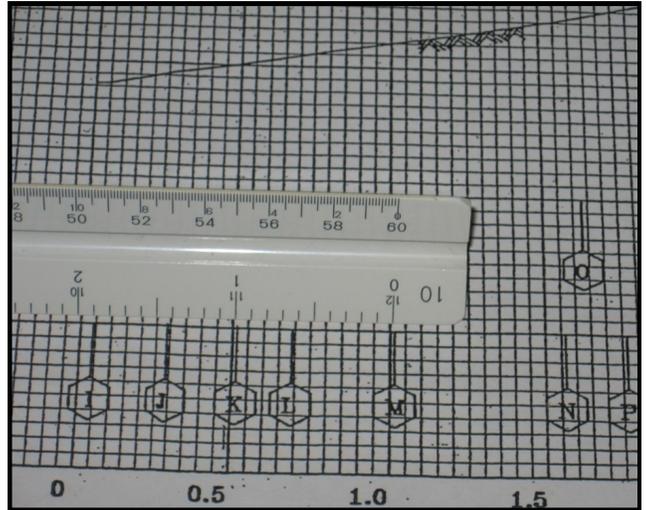


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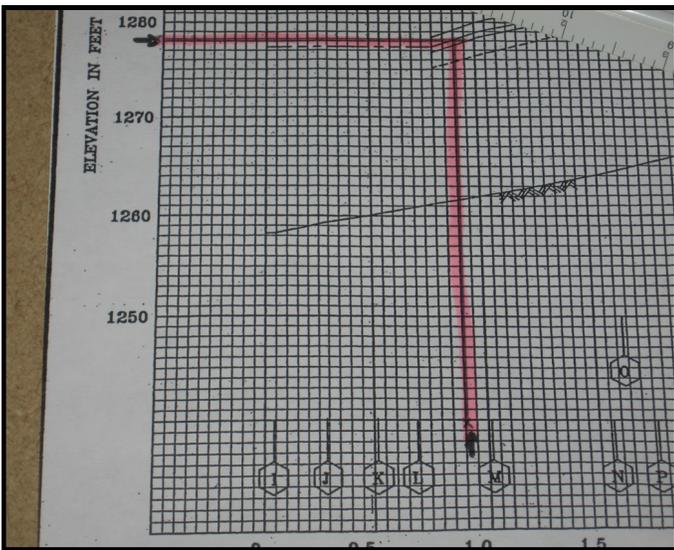
(Use of the Flood Insurance Study from previous page.)

Now that you know length of the channel and the location of your building along the channel you can go to the FIS book. Find the stream profile, in this case it is Dry Creek, and find cross sections L and M along the profile. Measure the distance between cross section L and M on the profile. With that information you can make a ratio of the distances to know where your structure will be in the graph of the stream profile found in the FIS.

The formula is something like this:  $A/B = C/X$ .  
 A is total length between L and M on the map.  
 B is distance from L to structure on the map.  
 C is the distance from L to M on the graphed profile.  
 X is the number you solve for to plot the structure in the FIS.



There will be times that a cross section goes directly through the building and you won't have to do any calculations. Bridges and culvert locations are shown on the stream profile and you can use that information to locate your structure on the profile when you know how far it is from a nearby bridge.



Locate your structure in the FIS profile. Use a straight edge to go up to the line showing the 1% annual chance flood. Now use the straight edge horizontally going over to the vertical side of the graph where elevations are marked. There are ten small lines making boxes between the 1270 and 1280 elevations. Each box represents one foot. The elevation line is just slightly above the line for the 1278 box at 1278.2.

A certain amount of judgment comes in to this. How sharp is your pencil? A dull pencil can take up a quarter of one of those small boxes and the width of the pencil line can equal two tenths of a foot on its own. Try to be as accurate as you can be.

Now that you have come up with a properly calculated BFE you can check your work. A simple thing to do is to find the floodway data tables in the FIS. Find the Regulatory Water Surface Elevation on the chart for the upstream and downstream cross sections. Is the number you calculated within that range of numbers? In the case that you come up with a number outside of that range then it is time to double check your measurements.

Contact Steve Samuelson at [steve.samuelson@kda.ks.gov](mailto:steve.samuelson@kda.ks.gov) if you can't find the FIS for your community.

| CROSS SECTION | DISTANCE <sup>1</sup> | FLOODWAY     |                            |                              | 1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION |                         |                      |                 |
|---------------|-----------------------|--------------|----------------------------|------------------------------|---|-------------------------|----------------------|-----------------|
|               |                       | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SEC) | REGULATORY (NGVD)                                     | WITHOUT FLOODWAY (NGVD) | WITH FLOODWAY (NGVD) | INCREASE (FEET) |
| DRY CREEK     |                       |              |                            |                              |   |                         |                      |                 |
| A             | 1.22 <sup>1</sup>     | 1,161        | 7,915                      | 1.5                          | 1,232.1   | 1,232.1                 | 1,232.8              | 0.7             |
| B             | 1.85 <sup>1</sup>     | 768          | 4,662                      | 2.6                          | 1,232.7   | 1,232.7                 | 1,233.4              | 0.7             |
| C             | 2.39 <sup>1</sup>     | 655          | 3,085                      | 3.9                          | 1,236.2   | 1,236.2                 | 1,237.2              | 1.0             |
| D             | 3.33 <sup>1</sup>     | 974          | 3,674                      | 3.3                          | 1,242.5   | 1,242.5                 | 1,243.5              | 1.0             |
| E             | 4.62 <sup>1</sup>     | 471          | 4,070                      | 2.9                          | 1,247.9   | 1,247.9                 | 1,248.9              | 1.0             |
| F             | 5.32 <sup>1</sup>     | 1,164        | 3,759                      | 3.1                          | 1,250.8   | 1,250.8                 | 1,251.8              | 1.0             |
| G             | 5.78 <sup>1</sup>     | 395          | 2,209                      | 5.3                          | 1,256.4   | 1,256.4                 | 1,257.3              | 0.9             |
| H             | 5.88 <sup>1</sup>     | 785          | 7,517                      | 1.6                          | 1,260.7   | 1,260.7                 | 1,261.7              | 1.0             |
| I             | 0.04 <sup>2</sup>     | 950          | 4,145                      | 3.3                          | 1,277.4   | 1,273.9 <sup>3</sup>    | 1,274.9 <sup>3</sup> | 1.0             |
| J             | 0.29 <sup>2</sup>     | 1,070        | 5,797                      | 2.3                          | 1,277.4   | 1,275.0 <sup>3</sup>    | 1,276.0 <sup>3</sup> | 1.0             |
| K             | 0.52 <sup>2</sup>     | 1,230        | 6,217                      | 2.2                          | 1,277.4   | 1,275.7 <sup>3</sup>    | 1,276.7 <sup>3</sup> | 1.0             |
| L             | 0.69 <sup>2</sup>     | 530          | 3,176                      | 4.3                          | 1,277.4   | 1,276.6 <sup>3</sup>    | 1,277.5 <sup>3</sup> | 0.9             |
| M             | 1.02 <sup>2</sup>     | 770          | 3,672                      | 3.7                          | 1,279.0   | 1,279.0                 | 1,279.7              | 0.7             |
| N             | 1.56 <sup>2</sup>     | 880          | 5,172                      | 2.6                          | 1,281.6   | 1,281.6                 | 1,282.4              | 0.8             |
| O             | 1.63 <sup>2</sup>     | 500          | 2,973                      | 4.6                          | 1,281.9   | 1,281.9                 | 1,282.7              | 0.8             |
| P             | 1.77 <sup>2</sup>     | 740          | 5,268                      | 2.6                          | 1,283.4   | 1,283.4                 | 1,284.2              | 0.8             |
| Q             | 1.97 <sup>2</sup>     | 940          | 5,085                      | 2.7                          | 1,284.5   | 1,284.5                 | 1,285.3              | 0.8             |
| R             | 2.23 <sup>2</sup>     | 910          | 4,008                      | 3.2                          | 1,285.8   | 1,285.8                 | 1,286.4              | 0.6             |
| S             | 2.34 <sup>2</sup>     | 850          | 5,163                      | 2.5                          | 1,287.1   | 1,287.1                 | 1,287.6              | 0.5             |
| T             | 2.62 <sup>2</sup>     | 650          | 3,479                      | 3.7                          | 1,287.7   | 1,287.7                 | 1,288.7              | 1.0             |
| U             | 2.83 <sup>2</sup>     | 190          | 1,574                      | 8.2                          | 1,289.8   | 1,289.8                 | 1,290.7              | 0.9             |
| V             | 3.31 <sup>2</sup>     | 920          | 8,028                      | 1.6                          | 1,293.6   | 1,293.6                 | 1,294.2              | 0.6             |
| W             | 3.64 <sup>2</sup>     | 1,000        | 6,566                      | 2.0                          | 1,294.0   | 1,294.0                 | 1,294.8              | 0.8             |
| X             | 3.82 <sup>2</sup>     | 560          | 3,962                      | 3.3                          | 1,294.4   | 1,294.4                 | 1,295.4              | 1.0             |

<sup>1</sup>Miles above confluence with Whitewater River <sup>2</sup>Miles above mouth of Santa Fe Lake <sup>3</sup>Elevation without consideration of backwater effect from Santa Fe Lake

FEDERAL EMERGENCY MANAGEMENT AGENCY  
 BUTLER COUNTY, KS  
 AND INCORPORATED AREAS

FLOODWAY DATA  
 DRY CREEK

## Training Opportunities

The Floodplain Management Program will host the following training sessions throughout Kansas. If you are interested in any of the no-cost training opportunities, please contact Tom Morey at 785-296-5440 or Steve Samuelson at 785-296-4622. A training registration form is in this newsletter.

### **Post Flood Responsibilities**

This free class is intended for community officials responsible for administering floodplain management regulations. The course focuses on what to do during and after a disaster event. Topics include substantial damage, permitting, Increased Cost of Compliance and violations. Approved 3.5 hours toward CFM. Limited to 20 participants.

- Paola - March 24, 2016 8:30 a.m.-12:30 p.m.

### **Elevation Certificates and Letters of Map Amendment**

This free class is designed for community officials responsible for administering floodplain management as well as surveyors and engineers who complete Letters Of Map Amendment (LOMA) and Elevation Certificate forms. The course will focus on accurate completion of Federal Emergency Management Agency (FEMA) technical forms, building diagrams and base flood elevation. Approved 3.5 hours toward CFM. Limited to 20 participants.

- Kinsley– April 14, 2016 8:30 a.m.-12:30 p.m.
- Lindsborg– May 10, 2016 8:30 a.m.-12:30 p.m.

### **Basics of the National Flood Insurance Program**

This class is for officials responsible for administering their local floodplain management ordinance. The focus is on the National Flood Insurance Program (NFIP) and concepts of floodplain management, maps and studies, ordinance administration, and the relationship between floodplain management and flood insurance. Approved 3.5 hours toward CFM. Limited to 20 participants.

- Holton - March 29, 2016 8:30 a.m.-12:30 p.m.

Find more information about floodplain management from Kansas Department of Agriculture  
Division of Water Resources on line at:  
<http://agriculture.ks.gov/divisions-programs/dwr/floodplain>

Email saves money on postage. The electronic newsletter also has links and the photos are in color. If you are getting this newsletter by postal mail and would prefer email please contact Steve Samuelson at [steve.samuelson@kda.ks.gov](mailto:steve.samuelson@kda.ks.gov).

Mark your calendar. The Kansas Association for Floodplain Management 2016 conference will be September 7 and 8 in Mulvane. More information will be posted at the website: [www.kafm.org](http://www.kafm.org). Registration will be done through a link on the website. If you have questions about registration please contact Don Slone, Chairman, at 913-667-1708.

**Kansas Department of Agriculture**  
**Division of Water Resources**  
**Floodplain Program**  
**Training Registration Form**

Name \_\_\_\_\_

\_\_\_\_\_

Title \_\_\_\_\_

Organization \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone \_\_\_\_\_ Fax \_\_\_\_\_

E-mail \_\_\_\_\_

Name, date and location of training you will attend \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\*Please share this invitation with anyone else who could benefit from the training.

\*\*Classroom locations will be sent to registered participants one week before the training.

Please mail or fax your registration to:

KANSAS DEPARTMENT OF AGRICULTURE  
FLOODPLAIN MANAGEMENT PROGRAM  
6531 SE Forbes Ave., Suite B  
TOPEKA, KS 66619  
Fax to: 785-296-7155

For questions about training, please contact Steve Samuelson by email at [steve.samuelson@kda.ks.gov](mailto:steve.samuelson@kda.ks.gov) or by phone 785-296-4622, or contact Tom Morey at [tom.morey@kda.ks.gov](mailto:tom.morey@kda.ks.gov) and 785-296-5440.

Please help us keep our records current. If the name that appears on this newsletter is for an individual no longer with your organization, please call 785-296-4622, or email [steve.samuelson@kda.ks.gov](mailto:steve.samuelson@kda.ks.gov) to report the change.

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Kansas Department of Agriculture  
Division of Water Resources  
Topeka Field Office  
Floodplain Management  
6531 SE Forbes Ave., Suite B  
Topeka, KS 66619

### **ASFPM 2016 National Conference in Grand Rapids**

The 2016 Association of State Floodplain Managers National Conference will be June 19-24, 2016 in Grand Rapids, Michigan This conference is an excellent opportunity for floodplain managers to receive training on mapping technologies, regulations, permitting, outreach and best practices. It is estimated the conference will be attended by more than 1,000 floodplain management professionals. This conference is great chance to meet people for networking and to learn the latest news in floodplain management.

### **KDA/DWR Water Structures Floodplain Program Staff**

|   |              |  |
|---|--------------|--|
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<http://agriculture.ks.gov/dwr>